ABSTRACT OF THE DISCLOSURE

A split barrier layer enables copper interconnect wires to be used in conjunction with low-k dielectric films by preventing the diffusion of N-H base groups into photoresists where they can render the photoresist insoluble. The split barrier layer is disposed between the copper and the low-k dielectric and includes a nitrogen-containing, oxygen-free film which contacts the copper, and an oxygen-containing, nitrogen-free film which contacts the low-k dielectric film. The nitrogen-containing film prevents the formation of undesirable copper oxides, and the oxygen-containing film prevents the diffusion of N-H base groups into the low-k dielectric films. The oxygen-containing film may be an oxygen-doped silicon carbide film in an exemplary embodiment. In another embodiment, a film stack of low-k dielectric films includes an etch-stop layer and hardmask each formed of oxygen-doped silicon carbide. The hardmask and etch-stop layer enable the formation of a dual-damascene opening in the film stack, and the film structure of the present invention precludes N-H base groups from diffusing from the low-k dielectric films and neutralizing acid catalysts in the photoresist used to define the dual damascene opening.

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